

## CLAIMS

What is claimed is:

1. An apparatus for cleaning a surface within a vessel having a vessel wall separating a vessel exterior from a vessel interior and having a wall aperture, the apparatus comprising:
  - an elongate conduit having an upstream first and a downstream second end and positioned to direct a shockwave from the second end into the vessel interior; and
  - a pressure probe comprising:
    - a body held in an operative position within the vessel interior so as to be exposed to the shockwave after the shockwave exits the conduit second end and having an exterior surface with a convergent nose portion;
    - a first port in the body;
    - a pressure sensor;
    - a passageway between the first port and the pressure sensor; and
    - a support member holding the body in the operative position.
2. The apparatus of claim 1 further comprising:
  - a source of fuel and oxidizer coupled to the conduit to deliver the fuel and oxidizer to the conduit; and
  - an initiator positioned to initiate a reaction of the fuel and oxidizer to produce the shockwave.
3. The apparatus of claim 1 wherein the pressure probe further comprises a cooling fluid circuit at least partially through the support member and body.
4. The apparatus of claim 1 wherein the body has:
  - a length between 2cm and 20cm; and
  - a maximum transverse dimension of no more than 4cm
5. The apparatus of claim 1 wherein the support member comprises a cooling liquid-carrying conduit joining the body from above.
6. The apparatus of claim 5 wherein the cooling liquid-carrying conduit extends through the vessel wall.

7. A pressure probe apparatus comprising:
  - a body having an exterior surface with a forwardly-convergent nose portion;
  - a first port in the body;
  - a pressure sensor;
  - a passageway between the first port and the pressure sensor;
  - a support member for holding the body in an operative position; and
  - a cooling fluid circuit at least partially through the support member and body.
8. The apparatus of claim 7 wherein:
  - the cooling circuit extends around a periphery of a conduit defining the passageway;and
  - the body has an aft surface with a second port and the cooling circuit extends through the second port.
9. The apparatus of claim 8 wherein:
  - the first port is on a flat; and
  - the aft surface has a third port and the cooling circuit bifurcates so as to extend through the second and third ports.
10. The apparatus of claim 8 in combination with a cooling liquid flow in the cooling fluid circuit.
11. The apparatus of claim 7 wherein:
  - the support carries a signal communication line from the pressure sensor.
12. The apparatus of claim 7 wherein:
  - the nose portion extends for at least 50% of a body length; and
  - along at least 50% of a nose portion length, the nose portion essentially converges forwardly with a half angle between 5° and 15°.
13. The apparatus of claim 7 wherein:
  - the cooling circuit spans, within the body, at least 50% of a body length.
14. The apparatus of claim 7 used in combination with a detonative cleaning apparatus.

15. A method for cleaning a surface within a vessel, the vessel having a wall with an aperture therein, the method comprising:
  - introducing fuel and oxidizer to a conduit;
  - initiating a reaction of the fuel and oxidizer so as to cause a shockwave to impinge upon the surface; and
  - using a pressure probe within the vessel to measure a pressure magnitude of the shockwave.
16. The method of claim 15 performed in a repeated sequential way.
17. The method of claim 15 wherein:
  - the reaction of the fuel/oxidizer mixture comprises a deflagration-to-detonation transition.
18. The method of claim 15 further comprising:
  - passing a cooling fluid through the pressure probe.
19. The method of claim 15 further comprising:
  - repositioning the pressure probe by acting upon a portion of a probe support member outside of the vessel.